Municipal Vulnerably Program Case Study

Municipality: *Town of Hull*
Project Title: *Assessment of Shoreline Resiliency Alternatives for Marginal Road, Hull*
Grant Award: $*25,373*
Match: $*8,850*

Community Overview:
Provide a general description of your community as a brief introduction to the project.

The portion of Marginal Road section of the Town of Hull is one of Hull's most vulnerable due to frequently flooding during moderate and high tides in recent times due to NW wind-driven waves coupled with continued sea level rise. Residents living adjacent to the proposed study area experience chronic flooding to their homes and prohibited access to or egress from their homes when Marginal Road is flooded. The project area also includes an important neighborhood commons (town-owned) which contains a public playground as well as the Town's Sewer Department's pump station that requires important repairs. The shoreline immediately south of the sewer pump station consists of a low-lying beach and fringing salt marsh and is vulnerable to north and northwest winds and tidal surge. It is situated within the Weir River Area of Critical Concern (ACEC), located in the southeast corner of Hingham Bay. The property is sheltered from direct wave exposure by the Hull peninsula to the east, Sunset Point to the north, and Worlds End to the west. To the northeast of the pump station, the roadway is fronted by a concrete knee wall that ties into the rock revetment at the base of the pump station. Historically, the southwest plot was fronted by a similar knee wall; however, this was damaged during storms and fell into disrepair. It was removed because it was considered a hazard and no other protection was ever put in place. This has created a flood pathway that allows flooding of Marginal Road the surrounding properties during storms and high tides. Residents of the project area have been supportive of Town efforts to improve overall resiliency of infrastructure in the area.

Description of Climate Impact:
Address the community's current and potential future vulnerability to climate change impacts. What are the specific threats to the project area/site and reasons for applying to the grant program?
The Municipal Vulnerability Preparedness (MVP) Community Resilience Building Workshop (CRB) provided an opportunity to build on the Town of Hull's (the Town) assessment of projected sea level rise and vulnerable municipal infrastructure, completed in 2016, and its Hazard Mitigation Plan, updated in 2018. At least 60% of the land in the Town of Hull is in areas that have an annual 1% chance for flooding. As such, all of Hull's low-lying land were identified as areas of concern. Another significant concern reported through the CRB was the number of roads that flood regularly even in relatively minor coastal storms which results in temporary isolation of residents in some areas of Hull. In addition, one of the highest identified priorities in the

findings report was to protect the wastewater treatment plant and associated town assets (e.g. pump stations) with an emphasis to flood proof or elevate key infrastructure.

The project sought to address each of these identified concerns and priorities: 13 Marginal Road is a town-owned parcel located on the seaward side of Marginal Road and contains Town Pump Station #4. The pump station property and adjacent roadway are located within the 1% annual chance flood zone on the northwest side of Sagamore Hill and, more frequently, when flooded isolates residents in Hampton Hill from the main Hull peninsula. Elevation measurements of the pump station property and surrounding shoreline collected in January 2019 (Woods Hole Group/CLS, 2019) range from 7 to 8 ft-NAVD, which is below the 10% annual chance storm elevation (8.4 ft NAVD), indicating that this area floods regularly in relatively frequent coastal storms, as well.

Project Goals:

What were the specific goals of the project?

This project used appropriate coastal processes analysis tools to assist in future efforts to determine effective shoreline stabilization and flood protection strategies. The analysis of this project estimates potential impact on adjacent properties, the nearshore region, and the roadway immediately landward of this parcel.

Approach and Result:

How did the project team implement the project? Describe the methodology or your approach to achieve the project goals. Describe, and quantify (where possible) project results (e.g. square footage of habitat restored or created). Provide web links, if available, to your project deliverables.

Historic data and recent site evaluations were utilized to evaluate the history of construction of the pump station. A design wave analysis was conducted using historical records of tides available from the Boston Harbor Tide Gauge from 1921 to present. Site surveys were conducted that evaluated current shellfish populations and marsh extents proximal to the pump station.

Lessons Learned:

What lessons were learned as a result of the project? Focus on both technical matter of the project and process-oriented lessons learned.

This town-owned parcel is located in a low-lying area and was originally constructed within the inter-tidal zone; therefore, the foundation has been exposed to tidal action for decades. Further, the low-lying nature of the area allows frequent storm events to flood across the roadway in this area, leading to additional infrastructure damage (e.g. broken sewer line

connections to the pump station). Due to this original construction location as well as sea level rise, the foundation of this pump station is deteriorating and the Town is seeking resiliency alternatives that can be constructed within an ACEC. Solutions for flood protection and providing safe access and egress for this area remains challenging and will most-likely require significant resources to effectively address, including elevating or relocated the pump station, elevating marginal road, and providing strategies for homeowners to reduce flooding vulnerability and accommodation to future flood mitigation efforts by the Town.

Partners and Other Support:

Include a list of all project partners and describe their role in supporting/assisting in the project.

Hull Sewer Dept., John Struzziery, Director
Asset assessments, Engineering and General Project Review
Hull Dept. of Public Works, Chris Gardner, Director
General Project Review
Applied Coastal, subcontractor, John Ramsey and Morgan Simms
Historical review, site assessment, wave overtopping analysis, storm surge and sea level rise evaluation, and reporting
Hull Conservation Dept., Chris Krahforst, Administrator
Project Management, reporting.